

NL030414

PATENT SPECIFICATION 724,640



Date of Application and filing Complete Specification : Sept. 18, 1953.

No. 25855/53.

Application made in United States of America on Sept. 19, 1952.

Complete Specification Published : Feb. 23, 1955.

Index at Acceptance :—Class 39(2), B2(B : F).

COMPLETE SPECIFICATION

Improvements relating to the manufacture of electric incandescent lamps

We, THE BRITISH THOMSON-HOUSTON COMPANY LIMITED, a British Company, having its registered office at Crown House, Aldwych, London, W.C.2, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to electric incandescent lamps and to the construction thereof relative to the soldering of the side lead-in wire. The invention is particularly, although not exclusively, concerned with a
15 miniature lamp having a flanged base, the side lead-in wire being soldered in an indentation in the side of the base shell so as to avoid any bulging or protruding of solder beyond the surface of the base shell.
20 The present miniature lamp has recently found extensive application in the illumination of instrument panels, particularly for aircraft. It is intended to be pushed or pressed into a relatively close fitting sleeve
25 type socket, bulb foremost, so that the flanged end of the base faces the front of the panel. A small spring clip locks into the end of the sleeve and holds the lamp in place. Generally the fixture is designed
30 so that the bulb projects inwardly of the panel and provides edgewise illumination of the instrument face. These lamps are of an extremely small size and the design tolerances imposed upon them are most
35 rigorous. Since the lamp is inserted into a relatively close fitting sleeve holder, it is essential that there be no solder bulging beyond the boundary of the base shell, that is beyond the cylindrical surface normally
40 defined by it. The bulging out of any solder on the side of the base, even though it may not prevent the lamp from being

forcibly pressed into the holder, makes its removal for replacement extremely difficult if not impossible.

Accordingly the object of the invention is to provide an improved method of securing the side lead-in wire by solder in the indentation in the side of the base shell in which no solder bulges beyond the boundary
50 of the shell.

In accordance with the invention, the side lead-in wire in an electric incandescent lamp is broken off at a point immediately beyond that at which it emerges from the
55 indentation by sharply bending it at that point and is then soldered to the base within the indentation. The breaking off of the lead wire is conveniently effected by pulling and shearing against the edge of the base
60 at the aperture through which the lead wire passes into the indentation; this insures that none of it projects beyond the cylindrical outline of the shell. The shearing or pulling off in the stated manner has the further
65 effect of sharply straining the wire in the immediate vicinity of the break. When applied to miniature butt-seal lamps, where the lead wires are "dumet", that is copper-sheathed iron wire, in order to insure that
70 a hermetic seal be made in the butt-sealing process, the wires are previously coated with a glass-wetting material, such as borax. The borax coating on the wire tends, however, to repel solder and makes soldering much
75 more difficult. However the strain which is produced near the break in the wire, results in a flaking off of the borate coating and the soldering is thereby greatly facilitated, so that a connection may be
80 made with a minimum of solder none of which bulges beyond the cylindrical outline of the shell.

The invention will now be described with the aid of the accompanying drawings, in 85

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which Fig. 1 is a side sectional view, greatly enlarged, through a miniature incandescent lamp embodying the invention and showing in fragmentary fashion a pair of wire 5 pulling jaws operatively positioned with respect to the lamps; and Fig. 2 is a side view of the same lamp seen at right angles to the view of Fig. 1.

The lamp is seen to comprise a butt- 10 sealed bulb 2, and a midjet flange base 3 fastened to the bulb by means of basing cement 4 in the shoulder region of the bulb. The overall length of the lamp may be approximately 7/16 inch. The main body 15 portion 5 of the bulb is of a cylindrical shape with the outer end 6 hemispherical, and the neck portion 7 is also cylindrical and reduced in diameter from the main body portion. The filament 8 is supported 20 within the bulb on lead-in wires 9, 11 which are composed of fine "dumet" wire, that is copper-sheathed iron wire having approximately the same coefficient of thermal expansion as the glass of the bulb. The leads 25 9, 11 are held in spaced relationship within the bulb by an oblong glass bead 12 into which they are fused. The lead wires are sealed through the neck of the bulb in the region 13 which, it will be appreciated, 30 corresponds to the region where the exhaust tube is fused to the neck of the bulb, the exhaust tube being tipped off after evacuation to form the tip 14.

The base 3 comprises a thin-walled metal 35 cylinder 16, preferably made by drawing, and having a slightly necked lower rim at 17 and an outwardly turned flange at 18. The flange at 18 is of double the thickness of metal of the base, the upper reverted 40 section providing an inwardly turned lip at 19 which is embedded in the plastic material of the insulating web 21 which closes the upper end of the base. The web is capped by an end contact or eyelet 22 to which one 45 of the lead wires, 9 in the drawing, is connected by soldering at 23.

The invention is more particularly concerned with the manner of connecting the other lead wire 11 to the cylindrical shell 16 50 of the base, and for convenience it will henceforth be referred to as the side lead wire. Since the lamp is intended to be inserted bulb foremost into a sleeve type socket into which the base fits quite closely, 55 the bulb 2 is intentionally made of a slightly smaller diameter than that of the shell 16 of the base. It is essential that no part of the lamp, exception being made of course for the flange 18, bulge out beyond the 60 cylinder defined by the wall 16 of the base. To this end, the side lead wire 11 is soldered in a well or depression 25 of a generally inverted "V" shaped configuration which slopes inwardly from the apex of the "V". 65 This is best seen in Fig. 2 wherein the

depression has been illustrated without any solder filling it. The depression may be made by a suitable punch and a co-operating die arranged to shear the metal near the bottom of the depression so as to open 70 an aperture at 26 for the end of the lead wire.

Prior to the invention, it had been the practice to draw out the lead wire 11 through the aperture 26 and to shear it off as short 75 as possible by means of scissor type cutters such as are well known in the art. This left a stub of appreciable length which, in order to prevent it from projecting beyond the cylindrical outline of the base, was 80 pressed flat against the inwardly sloping lip 27 of the depression. With this construction, it was found that the solder had a pronounced tendency to bulge out of the depression beyond the cylindrical outline of 85 the base. This apparently is due to the fact that the "dumet" lead wire 11 is borated and somewhat oxidized, resulting in a tendency to repel the solder. In order then to insure wetting of the wire to achieve 90 a good solder connection, a greater quantity of solder is required in the depression and the undesirable bulge of solder results. The excess solder then had to be scraped off.

We have evolved a construction which 95 permits soldering with a much smaller quantity of solder and which eliminates the bulging of the solder in all but a very small percentage of the bulbs during manufacture, and without requiring subsequent scraping. 100 In accordance with the illustrated embodiment of the invention, we provide a sharp bend in the lead wire at the point 28 so as to flake off any foreign material such as borate and oxide coating on the wire, and 105 break the wire off short at that point. This may be done by leading the wire upwardly through the aperture 26, bending it around and down close to the side of the base so as to achieve a reverse bend at the point 110 11a, and thereafter pulling down on the wire so as to sever it against the outer edge of the aperture. The pulling also produces some necking of the wire close to the break point which further helps in flaking off any 115 coating.

In the automatic manufacture of the lamps in an indexing type lamp finishing machine such as is disclosed for instance in Patent Specification No. 247,923, the 120 operation of pulling down and shearing off the projecting portion 116 of the wire may be performed automatically at a station of the machine. In general, the mechanism may comprise a pair of pivotable spring- 125 loaded jaws whereof a fragment is illustrated at 31 in Fig. 1, and which are arranged to close upon the projecting end 11b of the lead wire, and thereafter to swing down in the direction of the arrow 32. 130

In order to facilitate the wetting of the metal of the base and of the lead wire by the solder, it is preferably touched with a minute quantity of soldering flux after the side lead wire has been broken off. It will be appreciated of course, that the base has meanwhile been heated to insure that the tip of the solder wire will melt when applied into the depression 25. Immediately previous to the application of the solder, it has been found advantageous to play a tiny hydrogen reducing flame into the depression 25, after which the solder is pressed in, melts, and thereafter forms the mass 33 upon subsequent cooling. By following these precautions, it is possible to insure that the mass 33 of the solder does not bulge out beyond the cylindrical outline of the base in all except a very small percentage of lamps manufactured.

While a certain specific embodiment of the invention has been illustrated and described in detail, this embodiment is intended as a non-limitative example. It will be obvious to those skilled in the art that the features of construction which have been described may readily be applied to other types and designs of electric incandescent lamps where the same general problem arises of making a solder connection of a lead wire within a depression in the wall of the cylindrical base without allowing any bulging of the solder beyond the cylindrical outline of the base.

What we claim is:—

1. In the manufacture of an electric incandescent lamp, comprising a vitreous envelope and a metal base attached thereto, the base having an indentation in the side thereof leading to an aperture through which one of the lead wires to the lamp extends, the method of effecting connection of the base to the lead wire which comprises breaking off the lead wire at a point immediately beyond that at which it emerges from the indentation by sharply bending the wire at said point and soldering the end of the wire

to the metal of the base within the indentation, so that substantially no part of the solder projects beyond the boundary defined generally by the wall of the base.

2. In the manufacture of an electric incandescent lamp comprising a vitreous envelope and a metal base attached thereto, the base having an indentation in the side thereof leading to an aperture through which one of the lead wires to the lamp extends, the method of effecting connection of the lead wire to the base at the indentation which consists in sharply bending the lead wire by pulling it against the edge of the base at the aperture so as to shear the lead wire substantially at its point of emergence through the base whereby substantially none of the wire projects beyond the periphery of the base, and soldering both the end of the wire and the metal of the base within the indentation, so that no part of the solder projects beyond the periphery of the base.

3. A miniature incandescent lamp comprising a vitreous envelope and a base attached to one end thereof, the base comprising a cylindrical metal shell having a diameter slightly greater than that of the envelope, and provided with a generally "V" shaped indentation in the side thereof sloping inwardly from the apex of the "V" and with the metal of the shell sheared at the base of the "V" to provide an aperture within the indentation through which a lead wire to the lamp extends, the lead wire being connected to the base at the indentation by the method claimed in Claim 1 or Claim 2.

4. The method of securing a lead wire to the base of a miniature electric incandescent lamp substantially as described with reference to the accompanying drawings.

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This drawing is a reproduction of
the Original on a reduced scale.

FIG. 1.

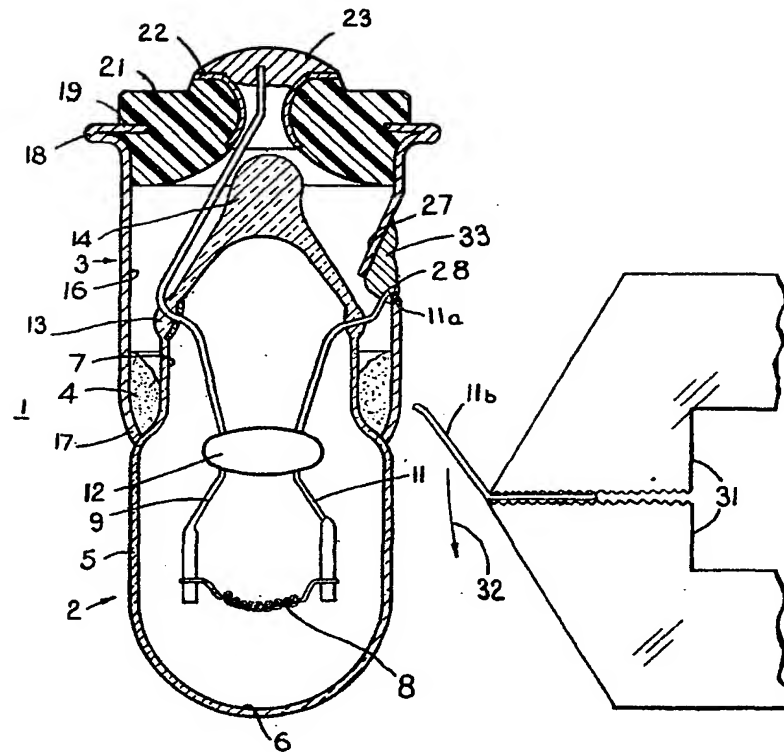


FIG. 2.

